(a) a filter for producing the conditioned analog signal having a desired frequency range;

(b) an amplifier for producing the conditioned analog signal at a desired amplitude; and

(c) an analog to digital converter (ADC) for receiving and sampling the conditioned analog signal to produce a digital signal, and having:

(1) a sigma-delta modulator having a number of cascaded sigma-delta loops and having a transfer function substantially of:

$$(z) = X(z) + (1-Z^{-1})^{-n}Q^n(Z)$$

where Q^n is the quantization noise from the sigma-delta modulator and n is the number of cascaded sigma-delta loops, the modulator receiving the conditioned analog signal and producing a digital modulator signal;

(2) a **[comb filter for digitally low-pass filtering and decimating the digital modulator signal from the modulator to produce a comb signal; and**

(3) a FIR] filter for digitally low-pass filtering and decimating the **[comb]** digital modulator signal to produce the digital signal for the data processor;

a data processor for processing the digital signal to produce desired digital data, the data processor including:

a transformer for selectively operating on the digital signal, performing a Fast Fourier Transform, and producing frequency spectrum data from the digital signal; and

memory interfaced with the data processor for storing at least some of the digital data.